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SUPERSEDING  
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MILITARY SPECIFICATION

SHOES, NONSPARKING, SAFETY, HIGH

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This document covers black nonsparking safety shoes with traction tread soles and heels, and steel box toes.

1.2 Classification. The shoes shall be of one type in the following sizes and widths, as specified (see 6.2).

TABLE I. Schedule of sizes

Schedule of widths	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10	10½	11	11½	12	12½	13	13½	14
XN	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
R	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
W	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
XW	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: U.S. Army Natick Research, Development, and Engineering Center, Natick, MA 01760-5014 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 8430

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## 2. APPLICABLE DOCUMENTS

2.1 Government documents.

- \* 2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

## SPECIFICATIONS

## FEDERAL

C-F-206	- Felt Sheet: Cloth, Felt, Wool, Pressed
V-L-61	- Laces, Nylon
V-T-285	- Thread, Polyester
V-T-295	- Thread, Nylon
KK-I-570	- Insole, Footwear, Leather, Cattlehide
KK-L-165	- Leather, Cattlehide, Vegetable Tanned and Chrome Retanned, Impregnated: and Soles
KK-W-231	- Welting, Leather, Shoe
TT-C-490	- Cleaning Methods and Pretreatment of Ferrous Surfaces for Organic Coatings
CCC-C-443	- Cloth, Duck, Cotton (Single and Plied Filling Yarns, Flat)
PPP-B-566	- Box, Folding, Paperboard
PPP-B-636	- Boxes, Shipping, Fiberboard
PPP-B-676	- Boxes, Setup

## MILITARY

MIL-L-3122	- Leather, Cattlehide, for Footwear Uppers, Chrome Tanned Fatliquored
MIL-L-10867	- Leather, Cattlehide, Gusset, Chrome Tanned, Fatliquored
MIL-C-13924	- Coating, Oxide, Black, for Ferrous Metals
MIL-S-22777	- Soles and Heels, Rubber, Traction Tread, Shoe
MIL-L-35078	- Loads, Unit: Preparation of Semipermanent Subsistence Items; Clothing, Personal Equipment and Equipage; General Specification For
MIL-C-41814	- Counter, Footwear
MIL-L-43585	- Lasts, Footwear, Safety Toe, Men's, U.S. MIL-7
MIL-M-43758	- Midsoles, Leatherboard

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### STANDARDS

#### FEDERAL

- FED-STD-191 - Textile Test Methods
- FED-STD-311 - Leather, Methods of Sampling and Testing
- FED-STD-751 - Stitches, Seams and Stitchings

#### MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
- MIL-STD-129 - Marking for Shipment and Storage
- MIL-STD-147 - Palletized Unit Loads
- MIL-STD-731 - Quality of Wood Members for Containers and Pallets

(Copies of specifications, standards, and handbooks required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issues of the nongovernment documents which are current on the date of the solicitation.

#### AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- B 36 - Brass Plate, Sheet, Strip, and Rolled Bar
- B 134 - Brass Wire
- D 5 - Penetration of Bituminous Materials
- D 573 - Rubber Deterioration in an Air Oven
- D 792 - Specific Gravity and Density of Plastics by Displacement
- D 1052 - Measuring Rubber Deterioration - Cut Growth Using Ross Flexing Apparatus
- D 1238 - Flow Rates of Thermoplastics by Extrusion Plastometer
- D 2240 - Rubber Property - Durometer Hardness
- D 3951 - Standard Practice for Commercial Packaging
- E 18 - Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
- E 28 - Softening Point by Ring-and-Ball Apparatus

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

AMERICAN NATIONAL STANDARDS INSTITUTE, INC.

ANSI Z41 - American National Standard for Personnel Protection-Protective Footwear

(Application for copies should be addressed to the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.)

(Nongovernment standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Guide sample. Samples, when furnished, are solely for guidance and information to the contractor (see 6.3). Variation from this document may appear in the sample, in which case this document shall govern.

- \* 3.2 First article. When specified in the contract or purchase order, a sample shall be subjected to first article inspection (see 4.3, 6.2, and 6.4).

3.3 Materials (see 6.5).

3.3.1 Leather. All leather components shall contain not less than 0.18 percent nor more than 0.70 percent paranitrophenol fungicide.

3.3.1.1 Upper leather vamps, quarters, and counterpockets. The leather for the vamps, quarters, and counterpockets, shall be smooth plated, full grain or corrected grain side leather conforming to treatment B of MIL-L-3122, except that the leather shall be treated with an approved water resistant compound and the maximum amount of chloroform soluble material in this leather shall be 18.0 percent. The thickness shall be as specified for the cut parts in 3.7.1. The break for vamps and quarters shall not be more than a break pattern of 4 when examined as specified in 4.4.3.1. The color shall be black. All finishes applied by the shoe manufacturer and tanner shall be compatible with one another to insure a long lasting lustrous finish.

3.3.1.1.1 Upper leather tongues. Tongues shall be gusset leather conforming to treatment A of MIL-L-10867, except that the leather shall be treated with an approved water resistant compound. The thickness shall be as specified for cut parts in 3.7.1. The color shall be black.

- \* 3.3.1.2 Midsoles. The midsoles shall be leather, leatherboard, or rubber.

3.3.1.2.1 Leather midsoles. The leather midsoles shall be full length and full grain leather conforming to types I, III, or IV, class 3, style 1, subclass b of KK-L-165. The midsole shall be not less than 3-1/2 irons or more than 5 irons in thickness after being leveled.

3.3.1.2.2 Leatherboard midsoles. The thickness of the leatherboard midsoles shall be 4-1/2  $\pm$  1/2 irons and shall conform to the requirements of MIL-M-43758.

\* 3.3.1.2.3 Rubber midsoles (see 3.3.4.1).

3.3.1.3 Welting. The welting shall conform to the requirements of KK-W-231.

3.3.1.4 Insoles. The insoles shall be cut from leather conforming to type I class 1, tannage a or b of KK-I-570. The insoles shall have either a channeled or stuck-on rib (see 3.3.6.3). The thickness of the channeled insoles shall be 6-1/2 irons and the thickness of the stuck-on rib insoles shall be 5-1/2 irons. As an alternate, the insole may be cut from Texorist material. The Texorist shall contain 0.25 to 1.00 percent copper-8-quinolinolate uniformly distributed throughout the insole. The Texorist insole shall be 0.116  $\pm$  0.010 inch thick. The insole shall be cut with the heel-to-toe direction across the machine direction of the Texorist. The Texorist insole shall have a stuck-on rib applied to the printed side of the material (see 3.3.6.3).

3.3.1.5 Vamp linings. The vamp linings shall be cut from soft pliable calf, kip, or side leather 3  $\pm$  1/2 ounces in thickness when tested as specified in 4.4.1. The leather shall be either chrome or vegetable tanned or a combination thereof. The leather shall be full grain or partially corrected grain. The color of the leather shall be as produced by the tanning agents. A light application of dye may be used to level the russet color of the grain surface. As an alternate to the above, the lining material may be split or grain pigskin, chrome or vegetable tanned, which may be chrome or vegetable retanned. When split pigskin is used, the pigskin shall be the first split from the grain side after the grain has been removed. The surface of the split that was nearest the grain surface shall be sealed with a clear lacquer and then smooth plated. The sealed plated surface shall be worn next to the foot. When full grain pigskin is used, it shall be finished on the grain side with a light application of aniline finish or on the flesh side with a clear lacquer sealer. The aniline finish or clear lacquer sealer shall be only sufficient to coat the surface fibers of the pigskin but shall not decrease porosity. When the flesh side is finished, the flesh side shall be smooth plated. The finished surface shall be worn next to the foot. The thickness of the pigskin shall be 2 to 3 ounces. The pigskin shall be drum dyed and the color shall be light russet. All the lining leather shall contain 0.18 to 0.70 percent paranitrophenol when tested as specified in 4.4.1.

3.3.1.6 Heel pads. The heel pads shall be cut from either chrome tanned or a combination of chrome and vegetable tanned, full grain or partially corrected lining leather, sheepskin, kip, calf, or cattlehide. The heel pads shall have a minimum thickness of 2 ounces and a maximum thickness of 3-1/2 ounces when tested as specified in 4.4.1. The color of the leather shall be as produced by

the tanning agents. A light application of dye may be used to level the color of the grain surface. Heel pads cut from vamp lining leather specified in 3.3.1.5 may be used. Upper leather conforming to 3.3.1.1 having the top finish removed to provide a good legend marking surface and of the above cited thickness, is also acceptable for heel pads. The heel pad shall contain not less than 0.18 percent nor more than 0.70 percent paranitrophenol fungicide when tested as specified in 4.4.1. As an alternate to the above, the heel pads may be cut from the pigskin leather specified in 3.3.1.5.

3.3.2 Counters. The counters shall be leather, leatherboard, shoeboard, or polyethylene.

3.3.2.1 Leather, leatherboard, or shoeboard counters. The leather, leatherboard, or shoeboard counters shall conform to the requirements of MIL-C-41814 for shoes, nonsparking, safety.

3.3.2.2 Polyethylene counters. The counters shall be molded from an unfilled polyethylene resin of natural color. The molded pieces shall be uniform in texture and finish and shall be free from porosity, cracks, and blisters. The polyethylene resin shall conform to the requirements of table II when tested as specified in 4.4.1.

TABLE II. Polyethylene resin requirements

Characteristic	Requirement
Density	0.91 to 0.93 g/mL
Melt index	1.0 to 5.0 g/10 minutes
Tensile strength, ultimate	1400 psi minimum
Elongation, ultimate	400 percent minimum

3.3.3 Pegs and nails, heel seat fastening. The heel seat fastening pegs shall be glue-sized paper base fiber, commercial type B or equal, 0.081 inch to 0.111 inch diameter regardless of the type of equipment used. The pegs shall be of sufficient length to secure firmly the parts through which they are driven and leave the insole smooth on the inside. Alternatively, the heel seat fastening may be done by using numbers 12 through 39 head, brass or steel loose nails of sufficient length to clinch on the insole.

3.3.4 Rubber compounds.

- \* 3.3.4.1 Midsole. The midsole shall be of nonmarking rubber. The hardness of the midsole shall be not less than 88 nor more than 95 before and after aging when determined by the Shore A Durometer. The cut growth after aging shall not exceed 500 percent after being subjected to 25,000 flexes when tested as specified in 4.4.1. The color shall approximately match the color of the outsole. The thickness of the midsole shall be not less than 5 irons nor more than 6 irons.

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3.3.4.2 Outsole. The outsole shall conform to type I, grade A of MIL-S-22777.

3.3.4.3 Heel, rubber. The rubber heel shall conform to type II, grade A, class 1 of MIL-S-22777.

3.3.5 Metals.

3.3.5.1 Steel box toe. The steel box toe shall be fabricated from cold-rolled carbon steel and shall conform, after heat treatment, to the requirements of table III when tested as specified in 4.4.1.

\* TABLE III. Physical requirements, steel box toe

Hardness, Rockwell C scale	Carbon content, percent	Thickness, inch	Size	Shape	Trade pattern	Coating
43 to 50	0.50 to 0.82	$0.062 \pm$ 0.0025	8	Conform to toe of last	400	<u>1/</u>

1/ The steel box toes shall be thoroughly cleaned by any method of TT-C-490 prior to coating. The steel toes shall be coated with a suitable coating that will assure protection against corrosion and will not damage component parts of the shoe. The coating shall be completely and uniformly applied to the base material.

3.3.5.1.1 Impact resistance. The steel box toe of the finished shoe shall have a minimum inside clearance of 1/2 inch when tested for impact resistance as specified in 4.4.3.3.

3.3.5.2 Shanks (see 3.3.9.2).

3.3.5.3 Nails, tacks, and staples. Heel seat lasting tacks, welt butting tacks, tacks or staples for attaching shank, and heel seat fastening nails when used (see 3.3.3), shall be brass or steel and shall be of sufficient length to secure the parts through which they are driven and leave the insoles smooth on the inside. Brass tacks shall be cut from material conforming to Alloy No. 6 or No. 8 of ASTM B 36.

3.3.5.4 Nails, heel attaching. Heel nails shall be brass, cut or wire type, and shall be of sufficient length to produce a clinch on the insole. The cut type nails shall be cut from material conforming to Alloy No. 6 or No. 8 of ASTM B 36 and shall be commercial number 450 or 1336 with a 10 gage point. Gaging of points shall be done with an English standard wire gage in which 20 gage is  $0.035 \pm 0.005$  inch. The points of nails should enter gage at least 1/32 inch. The wire nails shall be commercial type, 13-1/2 gage, with a flat clinching point and shall be cut from Alloy No. 7 of ASTM B 134.

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3.3.5.5 Eyelets. The eyelets shall be made of aluminum,  $0.0160 \pm 0.0015$  inch thick with roll setting barrel and shall conform to the following finish requirements when tested as specified in 4.4.1:

Outside diameter of flange	- 0.480 to 0.496 inch
Outside diameter of barrel	- 0.295 to 0.299 inch
Diameter of hole before setting	- 0.235 to 0.240 inch
Overall length	- 0.224 to 0.236 inch

3.3.5.5.1 Finish of eyelets. After fabrication, the eyelets shall be anodized and top roller coated or tumble coated with not less than two coats of black enamel.

3.3.6 Fabrics.

3.3.6.1 Channeled insole reinforcement. The insole reinforcement shall be cotton duck cloth conforming to type I of CCC-C-443.

3.3.6.2 Felt strip, masking tape, and toe cushion assembly.

\* 3.3.6.2.1 Felt strip. The felt strip for masking the steel toe breast line shall be a minimum of 1/2 inch in width and shall conform to type III, classification 9A-2 of C-F-206.

3.3.6.2.2 Masking tape. The masking tape for holding the felt strip against breast line of steel box toe shall be a 1-1/2 inch wide pressure-sensitive adhesive coated cloth tape.

3.3.6.2.3 Toe cushioning. The toe cushion to cover the steel box toe and the masked tape area shall be cut from a 1/8 inch thick polyurethane pad.

3.3.6.3 Stuck-on rib (when used, see 3.3.1.4). The finished rib shall be 7/32 to 8/32 inch high and not less than 5/8 inch wide measured from the inside vertical portion of the rib, and shall extend from heel breast line to heel breast line on the insole. The rib shall be made from coated fabric and fiberboard. The fabric shall conform to requirements specified in 3.3.6.3.1. The upstanding portion of the rib shall be one of the following: Not less than three plies of coated fabric folded over on itself; two layers of coated fabric with a fiberboard filler not less than 0.050 inch thick; or fiberboard and coated fabric.

3.3.6.3.1 Rib construction. The ribbing fabric used in the construction of the rib shall be unbleached cotton or cotton-synthetic fabric conforming to the requirements of table IV. The fabric shall be coated on one side with a rubber-base adhesive specified in 3.3.11, and bonded to the flesh side of the insole. The fabric or fiberboard shall cover 5/32 - 2/32, + 1/32 inch of the peripheral edge and extend over the top of the vertical rib, or the fabric may extend from the inside top of the vertical rib and cover the area between the ribs for a



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distance not less than 5/8 inch from the inside rib edge. The preformed rib shall be firmly and smoothly fitted and bonded to the flesh side of the insole as specified above to provide the required edge extension on the finished shoe. As an alternate, the fabric bonded to the flesh side of the insole, between the ribs, having a pinked edge is permitted.

TABLE IV. Ribbing fabric requirements

Weight, ounces per sq. yd. (min.)	Yarns per inch (min.)		Breaking strength (min.) pounds, warp and filling
	Warp	Filling	
8.0	52	30	105

3.3.6.3.2 Rib strength. The physical requirements for the rib strength shall conform to table V when tested as specified in 4.4.2.2.1.

TABLE V. Rib strength requirements

Characteristic	Minimum <sup>1/</sup>	Average
Shear strength	70 pounds	75 pounds
Stitch strength	20 pounds	30 pounds

<sup>1/</sup> No single determination (sample unit) shall fall below the minimum value specified and the average of all specimens (lot average) shall be not less than the average specified.

### 3.3.7 Thread.

3.3.7.1 Thread, upper fitting. All upper fitting operations shall be stitched with nylon thread conforming to types I, II, or III, of V-T-295, except that requirements for colorfastness shall not apply. The thread size shall be E for needle and bobbin on stitch type 301, and E for needle and B or E for the looper with stitch type 401. The color of the thread shall be black.

3.3.7.2 Thread, sole stitching. The thread for sole stitching shall be polyester and shall conform to type I, class 1, subclass C of V-T-285, except that requirements for colorfastness shall not apply. The color of the running thread shall be black and the color of the shuttle thread shall be natural. The running thread shall be size 10, 3 ply. The shuttle thread shall be size 10, 3 ply or size 10, 6 ply.

3.3.7.3 Thread, inseaming. The inseaming thread shall be polyester, size 10, 3 ply or 6 ply conforming to type I, class 1, subclass C of V-T-285. The color shall be natural.

3.3.8 Bottom filler. The bottom filler shall be either thermoplastic or cold process type.

3.3.8.1 Thermoplastic bottom filler. The thermoplastic type shall consist of a mixture of ground cork and a suitable thermoplastic binder in proportion, with a minimum of 2-3/4 parts by volume of cork to each one part of binder. The cork granules shall be free from bark. The ground cork and the binder shall be thoroughly and evenly mixed. The binder shall be water-insoluble. The binder shall have a softening point of at least 125°F and a maximum penetration of 85 mm with a 200-g load for 60 seconds at 77°F when tested as specified in 4.4.1.

3.3.8.2 Cold process bottom filler. The cold process type shall be spreadable without the use of heat. It shall consist of a mixture of ground cork and a suitable binder in the proportion of two parts cork to one part binder by volume. The cork granules shall be free from bark. When spread filler is dry and set, it shall consist of four parts cork to one part binder. The binder shall be water-insoluble and have a softening point of at least 150°F when tested as specified in 4.4.1. The binder shall be tested after evaporation to a constant weight level. As an alternate, a cold process bottom filler applied by semi-automatic equipment or method may be used. The alternate filler shall consist by weight of a mixture of one part ground cork to five parts suitable binder. Upon loss of solvent, the alternate filler shall consist by weight of one part cork to 3-3/4 parts binder. The binder shall be water insoluble and have a softening point of at least 125°F when tested as specified in 4.4.1.

\* 3.3.9 Shank. The shank shall be made of a shank board piece with a single reverse rib steel shank securely attached by four prongs or rivets. The steel shall be 1/2 plus or minus 1/16 inch from the front edge of the shank board piece. The shank board and steel shank shall be as specified in 3.3.9.1 and 3.3.9.2. As an alternate, a fiberglass shank (see 6.7) without shank board may be used. The shank shall consist of glass fibers impregnated with vinyl ester resins encased in a plastic sleeve or tube. The width of the uncured encased fiberglass resins shall be  $5/8 + 1/32$  inch. When fully cured, the shank (glass and resin area) shall be  $5/8 + 1/16$  inch in width. The shank length shall be  $5 + 1/16$  inches for size 4 and the lengths for other sizes shall grade up or down  $1/4 + 1/16$  inch. The forward end of the shank shall have a  $1/2 + 1/8$  inch taper. The heel end shall be tapered for a minimum of 3/8 inch.

3.3.9.1 Shank board. The shank board shall be water resistant (shank board that has been hot waxed is considered as being water resistant). The finished thickness of the shank board shall be  $1/8 + 1/32$  inch. The shank board shall be cut in accordance with Government furnished patterns specified in 3.5. The shank board pieces shall be molded to follow the bottom cavity of the shoes, and both ends shall be skived with a graduated scarf  $1-3/8 + 1/16$  inches wide. The shank board pieces shall be marked consecutively with a steel stamp starting with the figure "1" on the smallest size up to and including "6" on the largest size.

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3.3.9.2 Steel shank. The steel shank shall be constructed from 19 gage, 0.0418  $\pm$  0.0030 inch cold rolled carbon steel with a hardness ranging from 47 to 54 Rockwell C scale when tested as specified in 4.4.1 and shaped to the manufacturer's standard number 4 bend conforming to the arch of the U.S. MIL-7 last. The width of the steel shank shall be  $5/8 \pm 1/64$  inch. The steel shank shall be made with single rib. The overall thickness of the steel shank with rib shall be 0.080 to 0.125 inch. The steel shank shall have a zinc electroplated coating, dull or bright finish, or a zinc compound coating, completely and uniformly applied to the base metal following a cleansing by any method of TT-C-490. Steel shanks with black oxide coating conforming to class 1 of MIL-C-13924 or steel shanks with zinc phosphate coating may be used in lieu of steel shanks with zinc coating. The rib shall taper off at a point within  $3/8$  to  $7/8$  inch from each end. The steel shank for size 4 shall be  $4-1/2 \pm 1/16$  inches in length and the lengths for other sizes shall grade up or down  $1/4 \pm 1/16$  inch.

3.3.9.3 Shank fitting sizes. The shank fitting shall conform to the schedule as specified in table VI.

TABLE VI. Shank fitting schedule

Shank size	Shoe sizes		
	Widths XN and N	Widths R and W	Width XW
1	4 to 6 1/2	4 to 5	4 and 4 1/2
2	7 to 8 1/2	5 1/2 to 7	5 to 6 1/2
3	9 to 10 1/2	7 1/2 to 9	7 to 8 1/2
4	11 to 12 1/2	9 1/2 to 11	9 to 10 1/2
5	13 to 14	11 1/2 to 13	11 to 12 1/2
6		13 1/2 and 14	13 to 14

3.3.10 Laces. The laces shall conform to type II, class 3 of V-L-61. The color of the laces shall be black. The length of the laces shall be 33 inches for shoe sizes 4 to 9, and 35 inches for shoe sizes 9-1/2 to 14.

3.3.11 Adhesive. The adhesives used for bonding the various parts of the shoes shall be of the following types:

- a. Natural rubber latex.
- b. Synthetic rubber latex (including chloroprene).
- c. Natural rubber solvent cement.

- d. Synthetic resin cement.
- e. Synthetic rubber solvent cement.
- f. Synthetic cement for sole leather stock fitting.

3.3.11.1 Synthetic adhesive for sole leather stock fitting. The adhesive used for bonding the midsole and outsole (see 3.7.6), shall be compatible with carboxylated acrylonitrile rubber compounds and shall be resistant to jet fuels.

3.3.12 Wax, inseaming and sole stitching. The wax shall be white or golden and shall be a permanently plasticized resin. The wax when in the temperature range of normal machine use, shall thoroughly wax the threads described in 3.3.7.2 and 3.3.7.3.

3.3.13 Edge finish. The ink shall produce a bright hard finish and shall be uniform in appearance. The color of the ink shall be black.

3.3.14 Repairers. Repairers shall be liquid spray, or crayon or paste type applied by hand. The color shall match the upper leather and shall have sufficient coverage to correct minor surface imperfections of the leather.

3.3.15 Renovators. Renovators, used in lieu of or in addition to repairers, shall match the color of the upper leather. Application may be by sponge or spray method.

3.3.16 Fillers. Fillers, where used, shall be capable of providing a foundation for the application of the top finish and shall be applied by sponge or spray method.

3.3.17 Top finish. The top finish shall be applied by either the sponge or spray method and shall be a material compatible with and capable of wetting into and binding the previously applied compounds. The finish shall match the dyed leather and shall provide luster.

3.4 Design. The design shall be for a welt construction high blucher shoe cut from grain-out leather. The shoe shall have a full plain toe vamp, whole blucher quarter, one-piece full height outside counterpocket, one-piece half bellows tongue with extended eyelet facings, leather vamp lining, and a safety steel box toe. The shoe shall have an insole, leather, rubber, or leatherboard midsole, and a traction tread sole and heel with chevron design.

- \* 3.4.1 Safety toe performance requirements. The finished shoes shall conform to the class 75 impact and compression resistance requirements of ANSI Z41. Prior to the first shipment or delivery, the contractor shall submit to the contracting officer or his authorized representative satisfactory evidence that the shoes he proposes to furnish under this document meet the applicable requirements of ANSI Z41 (see 4.1.1.1). The label requirements shall be in accordance with 3.7.4.2.

- \* 3.5 Patterns and dies. A standard set of paper patterns and their markers will be furnished by the Government as a basis from which the contractors dies and patterns shall be made. The upper pattern shall have a slight slant at top of high roll in accordance with Government furnished patterns. The contractor shall furnish the wood insole rounding patterns conforming to paper patterns furnished by the contracting activity. The patterns, markers, and contractors cutting dies and patterns shall consist of the component parts specified in table VII. The Government patterns and markers shall not be altered and shall be followed except that up to 1/8 inch may be added to the vamp wings, and the lasting allowance shall be determined by the contractor. An outside counterpocket may be used with an inverted "V" removed in the center of the back of the counterpocket. The height of the cut for this inverted "V" shall be a maximum of 1-1/4 inches from the bottom of the lasting allowance on a size 4 and grade upward to a maximum height of 1-1/2 inches on size 14. The point of this inverted "V" shall be in the center back of the counterpocket. All outer lines of this counterpocket must conform to Government patterns except for this inverted "V". This "V" shall be removed in a curved line to conform after closing to the back part of the U.S. MIL-7 safety toe last. As an alternate, the counterpocket may be modified to fit flush with top edge of the quarters, and springing of the counterpocket wings to accommodate adequate counter room is acceptable.

TABLE VII. Patterns and dies by widthComponent parts

Vamp	Whole and half sizes, all widths
Quarter	Whole and half sizes, all widths
Counterpocket	Whole and half sizes, all widths
Tongues	Whole sizes, all widths
Vamp lining	Whole and half sizes, all widths
Insole rounding	Whole and half sizes, all widths
Shank board	6 sizes, widths not applicable

Markers

Vamp	Whole and half sizes, all widths
Quarter	Whole and half sizes, all widths

3.6 Lasts. The shoe shall be made on standard U.S. MIL-7 (MIL-L-43585) men's safety toe lasts, all sizes and widths of which will be loaned to contractors by the Government.

### 3.7 Construction.

3.7.1 Cutting uppers. The uppers shall be cut from grain-out leather. The leather shall conform to the thickness specified in table VIII. Vamps shall be cut from the bend area of the side leather.

TABLE VIII. Thickness of upper leather

Part <u>1/</u>	Minimum ounces	Maximum ounces
Vamp	5	6
Quarter	4-1/2	6
Outside counterpocket	4	6
Tongue	2-3/4	3-1/2

1/ None of these parts shall be split or shaved. No parts cut off stretch shall be accepted.

3.7.2 Skiving. The skiving of upper leather parts shall conform to the requirements specified in table IX.

TABLE IX. Skiving requirements

Part	Side	Location	Scarf width inches			Scarf edge thickness (millimeters $\pm$ 0.3 mm)
			6 ounce leather	5 ounce leather	4-1/2 ounce leather	
Quarter	Flesh	Back edge	$3/16 \pm 1/32$	-	$1/16 \pm 1/64$	1.5
Quarter	Flesh	Lasting edge	$5/8 \pm 1/8$	-	$13/64 \pm 3/64$	1.5
Quarter	Flesh	Top edge eyelet row edge	$3/16 \pm 1/32$	0	-	$1.5 \pm 1/$
Vamp	Flesh	Throat and wings	$3/16 \pm 1/32$	$1/8 \pm 1/32$	-	1.2

1/ The tolerance for this measurement only shall be  $\pm 0, -0.5$  mm.

NOTE: A dash indicates that the scarf width is the same as indicated in the preceding column.

3.7.3 Crimping. The vamps may be crimped, if necessary, to insure tight lasting.

3.7.4 Marking, permanent identification. The inside quarter of each shoe shall be marked on the grain side with the correct size and width, the contractor's identification symbol, and the month and year (expressed numerically) of the date of contract. The marking shall be impressed into the grain side of the leather in such a manner as to be permanently visible without cutting through at any point, and shall be placed approximately in the center of the inside quarter,  $1/2 \pm 1/8$  inch below the top. Figures shall be Arabic-type and letters Gothic. The figures and letters shall be a minimum of  $9/32$  inch and maximum of  $3/8$  inch in height. The contractor's symbol shall be in a block as shown by the following example: 10 W /AB/ 4-88.

3.7.4.1 Description marking. Each heel pad shall contain a description marking imprinted with an electrical embossing machine using indelible ink. The letters shall be Gothic type and shall be a minimum  $3/16$  inch in height. The legend shall read as follows.

THESE NON-SPARKING SHOES HAVE OIL AND JET FUEL RESISTANT  
SOLES AND HEELS AND PROTECTIVE STEEL TOES

\* 3.7.4.2 ANSI labeling. The shoes shall be labeled to indicate that they conform to class 75 safety toe requirements specified in ANSI Z41. Each shoe shall have an indelible cloth label sewn to the inside of the tongue with a row of stitches across the top and bottom edges of the label. The label inscription shall be as follows:

ANSI Z41 PT 1/  
M I/75 C/75

1/ Two additional digits designating the year of the standard to which the shoe complies shall be used to fill in this blank.

3.7.5 Upper leather fitting. Line marking patterns shall be used for all upper fitting. No die stab marking will be allowed. Quarters shall be closed at the back using stitch type 401 of FED-STD-751. The back seam shall be closed with stitching closely positioned to the edge of quarters on the grain side, and shall be rubbed down. A nominal  $1/2$  inch cotton tape may be used to cover the backseam stitching, if desired. All other upper stitching shall be done using stitch type 301. All upper stitching shall be 8 to 10 stitches per inch.

3.7.5.1 Counterpocket fitting. The outside counterpockets shall be stitched to the quarters with three or four rows, with a single or double needle machine, spaced  $1/16 \pm 1/32$  inch between rows. If inverted "V" seam counterpocket is used, the "V" seam shall be closed, sewing upward from the lasting edge. The closing shall be done with one row of stitching using stitch type 401 and stitched 8 to 10 stitches per inch. This seam shall extend approximately  $1/16$  inch on the flesh side and shall be rubbed down. The butt side of this seam shall be on the flesh side of the leather.



3.7.5.2 Tongue fitting. The tongues shall be stitched to the vamp, grain side out with two rows of stitching, with one row not more than  $\frac{3}{32}$  inch from the edge of the tongue and a second row placed not more than  $\frac{3}{32}$  inch from the edge of the vamp and vamp lining, both of these rows to include stitching through the vamp lining. The tongue, including the portion of the extended eyelet facings, shall be stitched to the quarters with the edge and eyelet rows trimmed flush to  $\frac{1}{8}$  inch undertrim. The top skived edge of the quarters shall not be stitched. Tongues and quarters shall be pounded at the throats before vamping.

3.7.5.3 Eyeletting. On each quarter, there shall be four eyelets on sizes 4 through 9 and five eyelets on sizes 9-1/2 through 14. The edge of the eyelets shall be  $\frac{1}{8}$  to  $\frac{5}{16}$  inch from the edge of the quarter. The eyelets shall be spaced evenly from the blucher nose to the top of the quarter. The eyelets shall be securely and smoothly clinched.

3.7.5.3.1 Lacing for lasting. The machine lacing for lasting shall provide a  $\frac{3}{4} + \frac{1}{8}$  inch opening after lasting. The quarter shall be laced in either the two lower pairs of eyelets or in the second and third pairs of eyelets from the blucher point.

\* 3.7.5.4 Vamping, barring. Vamping shall be done with a two rows of stitching close on the edge of the quarter plus two rows, single or double machine stitched, spaced  $\frac{5}{32}$  to  $\frac{1}{4}$  inch between inside rows. The vamp lap shall extend beyond the second two spaced rows, but not more than  $\frac{3}{16}$  inch. The bar row shall be uniformly spaced between and parallel to the two rows of vamping. The vamp bar shall consist of one or two rows and shall be  $\frac{5}{8} + \frac{1}{16}$  inch in length on each blucher ear. The barring shall be done by either single or double needle, or by the automatic method with tying or locking ends. As an alternate, the barring may be located (centered) between the inside double row of vamping and the inside (back) single row of lace row stitching.

### 3.7.6 Midsole to outsole attachment.

3.7.6.1 Leather midsoles. The grain side of the leather midsoles and the reverse side of the rubber outsoles shall be roughed their full length with coarse abrasive paper. Two coats of adhesive as specified in 3.3.11.1 shall be applied to the roughed grain side of the leather midsole. The first coat serves as a primer and shall be allowed to dry before application of the second coat. A single coat of the same adhesive shall be applied to the buffed mating surface of the rubber outsole. The combined leather midsole and rubber outsole shall have a minimum bond strength of 8 pounds per inch of width, when tested as specified in 4.4.2.2.2.

3.7.6.2 Leatherboard midsole. The entire surface of the rubber outsole which is to be combined to the leatherboard midsole shall be roughed with coarse abrasive paper. Two coats of the adhesive specified in 3.3.11.1 shall be applied to one side of the leatherboard midsole. The first coat which serves as a primer shall be allowed to dry before application of the second coat. A

single coat of the same adhesive shall be applied to the roughed surface of the rubber outsole. The leatherboard midsole and rubber outsole shall be combined by placing their coated surfaces together under sufficient pressure to assure a secure bond (see 4.4.2).

- \* 3.7.6.3 Rubber midsole and outsole. The inner surfaces of the rubber outsole and rubber midsole shall be roughed their full length with a coarse abrasive paper prior to cementing. The entire roughed surfaces of the midsole and outsole shall be coated with a cement specified in 3.3.11 that is compatible with rubber compounds. The combined midsole-outsole shall have an average minimum bond strength of 12 pounds per linear inch of width with no individual value below 10 pounds when tested as specified in 4.4.2.2.3.

3.7.7 Leather insoles. The leather insoles shall be sorted for varying fibers to get uniform channeling and cased for even weight. The insoles shall be fleshed. The insoles shall be rounded to pattern. Die cut insoles will be accepted provided they conform to insole patterns loaned by the Government. A  $\pm 1/64$  inch tolerance from Government loaned insole patterns will be allowed.

- \* 3.7.7.1 Insole scoring. The lip scoring cut shall not penetrate to a depth exceeding 50 percent of the insole thickness and the scoring for channeled insoles or marking for stuck-on rib insoles shall be located  $2-5/8 \pm 1/16$  inches from the heel end of a correctly rounded or die cut size 8R insole, and shall grade up and down from that size in accordance with the rate of grade obtained from a lip cutting and scoring machine.

3.7.7.2 Insole channeling. The insole except stuck-on rib insoles shall be channeled and may be chamfered. The channel leaf and outside lip shall be not less than one-third the thickness of the insole, and the channel leaf shall be slightly thicker than the lip. The in-between substance shall be  $1/64$  to  $1/32$  inch greater than the combined thickness of the leaf and lip. The channel margin shall be a minimum of  $5/32$  inch and the maximum shall not exceed the required extension on the finished shoe (see 3.7.19). The lips shall be cemented with a latex adhesive specified in 3.3.11 (a) or (b) and pressed together at lip setting to incline inward and be a minimum of  $1/8$  inch in height.

3.7.7.2.1 Assembly of stuck-on rib. When assembled, the stuck-on rib insoles shall meet the requirements of 3.3.6.3.

3.7.7.3 Insole backing. All insoles except stuck-on rib insoles (see 3.3.6.3.1) shall be reinforced by the application of cotton duck specified in 3.3.6.1. The duck shall be coated on one side with any adhesive compound specified in 3.3.11 and bonded to the flesh side of the insole. The duck shall cover the entire area between the ribs from the score line forward, shall extend to the top of the upstanding rib, shall be firmly and smoothly fitted and bonded to the base and the lip, and shall be trimmed to the required rib height. The insole shall be cemented with any adhesive specified in 3.3.11 on the flesh side prior to attaching the coated duck.

3.7.8 Lasting. Uppers may be conditioned by any suitable means except dipping in water. The correct size and width of uppers, lasts, and insoles shall be assembled. Insoles shall be tacked to the last with not less than five tacks: one of the five tacks shall be in the center of heel seat, one at shank, one at each side of the ball, and one at the toe. Staples in lieu of tacks may be used for attaching the insole to the last. Edges of the insole shall be flush with the last bottom at all points. The heel seat of the insole shall be smooth and even with the heel seat of the last. Counters shall be assembled in accordance with sizing schedule so that they will fill the counterpockets and the counters shall be such as to assure the inseam stitching catching the ends of the counter with one or more stitches. Counters shall be cemented on both sides except that cementing of polyethylene counters is optional. When leather counters are used, the flesh side of the leather counter shall be towards the inside of the shoe. One-half + 1/8 inch of the counter shall be turned over the last at the bottom. Uppers of the correct size and width shall be assembled to the lasts in a manner to provide for a wiped-in heel seat approximately 1/2 inch. As an alternate, heel seat lasting may be done by any suitable method or equipment to assure a flat, secure heel seat. Uppers shall be drawn over the lasts with tension on the pulling-over machine to assure that the quarters at the blucher points and the vamps are down to the last, and blucher noses are even. Sides of shoes shall be spindled, drawing the upper snugly to the last, and then side-lasting so that when stapled, the upper will be held securely to the last. Side-lasting and inseaming operations may be performed simultaneously (see 3.7.9). The heel seat shall be wiped-in and tacked and shall be flat and free from wrinkles. When the alternate methods are used for forepart and heel seat lasting, excess upper material shall be trimmed so as not to interfere with the cementing of the lasting operation.

3.7.8.1 Steel toe lasting. The vamp shall be laid back sufficiently to accommodate the steel toe. The correct size steel box toe shall be inserted. The felt strip, described in 3.3.6.2.1, shall be superimposed on the vamp lining directly to the rear and abutting the edge of the steel box toe. Then the masking tape, described in 3.3.6.2.2, shall be placed to completely cover the curved felt and mask the joint of the felt strip and the steel box toe edge. The polyurethane cushion pad described in 3.3.6.2.3 shall be placed so as to cover the steel box toe, felt strip and masking tape. Then the vamp shall be lasted back in place, the toe shall be firmly and smoothly wiped in, and the toe wire or nylon filament shall be attached securely around toe at the base of the insole rib, providing a shoulder for subsequent inseaming. As an alternate, any suitable equipment or method may be used to smoothly and securely attach the toe around the base of the insole rib.

3.7.8.2 Time allowance on lasts. The shoes shall remain on the lasts a sufficient length of time to thoroughly dry the counters, uppers, and sole leather.

\* 3.7.9 Inseaming. Inseaming shall be done by machine, with the thread waxed and with tension on the thread, using not larger than a number 41 needle and not less than 3-1/4 stitches to the inch. The welting shall be tempered to provide a tight seam. The welting shall be inseam stitched to the bottom of insole rib, from rib end to rib end, and, except when polyethylene counters are used, shall catch in counter with one or more stitches at each rib. As an alternate, the operations for side-lasting and inseaming may be performed simultaneously with any suitable equipment or method. Prior to heel seat lasting and inseaming, each shoe shall be spindled, have the forward edge of the counter pulled into position, and have the upper, with its lining, drafted snugly down to the last on both sides of the shoe.

3.7.10 Tack and staple pulling, inseam trimming. All tacks and staples shall be removed from the insole bottom and no broken tack or staple points shall remain. The inseam shall be closely trimmed from butt to butt of welt without cutting or damaging the stitches. The ends of the welt shall be skived with a  $5/8 + 1/8$  inch bevel tacked within the butt area. The welts shall be beaten out smoothly while in temper to lie flat around the entire forepart of the shoe.

#### 3.7.11 Shank fitting and bottom filling.

3.7.11.1 Steel shank. The shanks shall be selected for correct size in accordance with the shank fitting schedule specified in 3.3.9.3. The shanks shall be inserted in position with the shank board filling the cavity between the inside and outside ribs from the ball line rearward to the back of the heel seat. The forward end of the shank shall be flush with the insole, fit the contour of the shoe bottom back of the ball line, and be attached to the shoe with pitch, wax, or two tacks or staples, one at each side of the shank board piece at the rear end of the shank board. The bottom filler shall be firmly pressed into the insole channel from the toe to the forward end of the shank board with a uniform and even surface. The bottom shall present a flat, smooth surface for sole laying. No bottom filler shall remain under the shank piece or over the welt. Any excess cavities between the shank board and the insole rib, and in the heel seat area shall be filled with bottom filler.

\* 3.7.11.2 Fiberglass shank. When the alternate fiberglass shank specified in 3.3.9 is used, the forward end of the shank shall be positioned approximately 1/2 inch rearward of the ball line with the back end extending into the heel seat area. The shank shall be cured and bonded to the insole and shall conform to the shape of the last. The bottom filler shall be applied from the forward end of the shank back through to the heel seat, filling all cavities around the shank.

3.7.12 Sole laying. The shoe bottoms shall be cemented from toe end to heel breast line with any adhesive specified in 3.3.11 and after the combined midsole and rubber outsole have been cemented as specified in 3.7.6, the midsole shall be cemented over the entire inner surface and shall be laid on a sole laying machine with pressure. The soles shall be of adequate size and shall be laid evenly in order to prevent the sole stitching from running into the plaque area and to allow for the specified edge extension.

3.7.13 Rough rounding. Soles shall be uniformly rounded on a rough-rounding machine for the specified edge extension of sole and welt specified (see 3.7.19).

3.7.14 Sole stitching. Soles and welts shall be stitched together on a lockstitch machine, using waxed polyester thread size 10, 3 ply for the running thread and size 10, 3 ply or size 10, 6 ply for the shuttle thread with a No. 45 round blade chisel point awl and not larger than a No. 45 needle, using 4-1/2 to 7 stitches per inch except that there shall be no more than 3-1/2 stitches per any one half inch length in the ball and toe sole stitching. The stitching shall be laid on the surface of the welt, close to the outer edge of the welt and the stitches shall extend under the heel on the finished shoes. The stitching shall be with the lock (peg) just under the surface of the outsole. The edge gage shall not be removed too far ahead of the joint.

3.7.15 Heel seat fastening. The heel seat fastening shall be done by a fiber fastening machine using fiber pegs specified in 3.3.3. When fastening is accomplished using automatic (gang fastener) equipment, the pattern provided by the equipment will be acceptable. When the pegs are driven one at a time, there shall be not less than four to the inch. Nails when used, shall be spaced not less than three to the inch and shall clinch properly on the insole. Pegs and nails shall be positioned at the edge of the insole and extend around the heel seat from welt butt to welt butt.

3.7.16 Heel seat rounding. The heel seat of the outsoles shall be smoothly rounded from welt butt to welt butt.

3.7.17 Leveling. Bottoms shall be progressively leveled while in temper on a leveling machine by means of metal rolls. The machine shall be adjusted to level bottom of the sole from toe end, back to breastline. As an alternate, any suitable equipment may be used, that will adequately level the sole bottom while in temper.

\* 3.7.18 Heeling. Heels, specified in 3.3.4.3, shall be of correct size and shall be attached with 13 nails for sizes 5-1/2 through 14 shoes and 7 nails for sizes 4, 4-1/2 and 5 shoes. The nails shall be of a length to insure a secure clinch on the insole. The heeling machine shall be equipped with proper length drivers to drive the heel nails evenly against the core so that the nail heads sink below the rubber surface and are not visible.

3.7.19 Edge trimming. Edges shall be trimmed square. The finished minimum extension of outside ball shall be not less than 3/16 inch and of toe and inside ball not less than 1/8 inch, when measured at right angles to the upper.

3.7.20 Edge setting. The leather portion of the edge, consisting of welt and midsole, shall be stained with ink specified in 3.3.13 to match the color of the upper leather, set on the edge setting machine, and made smooth and bright. The top surface of the welt shall be black. No iron stain shall be permitted. When leather-board midsole is used, edge setting with a hot iron need not apply.

3.7.21 Heel finishing. The heel shall be trimmed and smoothly scoured. The leather heel seat shall be stained and finished to match the sole edge.

3.7.22 Finishing.

3.7.22.1 Preparation. The shoes shall be cleaned, by removing the accumulated dirt, such as wax, cement, and the surface of the leather shall be conditioned to receive further application of the finish. All thread ends shall be trimmed.

3.7.22.2 Treeing. The shoes shall be treed while on the lasts, or on a treeing machine using right and left tree feet conforming to the U.S. MIL-7 safety toe. All wrinkles shall be removed. No material shall be used that may injure the leather or thread.

3.7.22.3 Final finish. Shoes shall be repaired and filled. All raw edges, including vamping line, counterpocket, and top and front edges shall be stained to match the upper leather. Materials and methods shall be as specified in 3.3.14 to 3.3.17 inclusive.

3.7.23 Nails, tacks and staples. Nails, tacks and staples that have been left protruding through or around the insole, and cannot be pulled out, shall be cut close to the surface leaving no protruding stumps. A mechanical tack detector or other suitable method may be used to indicate the presence of any protruding tacks or staples inside the shoe.

3.7.24 Heel pad attaching. The flesh side of the leather heel pad shall be coated with an adhesive as specified in 3.3.11. Heel pads shall be pressed firmly and completely into the heel seat. Heel pads shall be fitted in accordance with size schedule.

3.7.25 Lacing. The shoes shall be mated. A lace shall be inserted through the top eyelet of the outside quarter of each shoe, and the two laces shall be tied firmly together.

3.7.26 Repairs of stitching.

3.7.26.1 Type 301 and 401 upper fitting stitches. Repairs of type 301 and 401 stitches shall be as follows:

a. When thread breaks or bobbin run-outs occur during sewing, the stitching shall be repaired by restarting the stitching one stitch in back of the end of stitching.

b. Thread breaks or two or more consecutive skipped or run-off stitches noted during inspection of the item (in-process or end item) shall be repaired by overstitching. The stitching shall start one stitch in back of the defective area, continue over the defective area, and continue one stitch beyond the defective area onto the existing stitching.

3.7.26.2 Inseaming and sole stitching. Repairs of inseaming and outsole stitches shall be in accordance with 3.7.26.1 a and b above and in addition, thread cuts occurring as a result of trimming operations shall be repaired in the same manner as specified for thread breaks.

3.8 Replacement of defective components. During the cutting and manufacturing process, components having material defects or damages that are classified as defects in 4.4.2.1.1, 4.4.2.1.2 and 4.4.3.1.1 shall be removed from production and replaced with nondefective and properly matched components.

3.9 Workmanship. The finished shoes shall conform to the quality of product established by this document. The occurrence of defects shall not exceed the applicable acceptable quality levels.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this document where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

\* 4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this document shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirement in the document shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

\* 4.1.1.1 Standard compliance. Acceptable evidence of meeting the applicable requirements of ANSI Z41 shall be a certified test report from a recognized, independent testing laboratory acceptable to the Government stating that the shoes have been tested and conform to ANSI Z41 (see 3.4.1).

\* 4.1.2 Responsibility for dimensional requirements. Unless otherwise specified in the contract or purchase order, the contractor is responsible for assuring that all specified dimensions have been met. When dimensions cannot be examined on the end item, inspection shall be made at any point, or at all points in the manufacturing process necessary to assure compliance with all dimensional requirements.

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4.1.3 Certificate of compliance. Where certificates of compliance are submitted, the Government reserves the right to inspect such items to determine the validity of the certification.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).

\* 4.3 First article inspection. When a first article is required (see 6.2), it shall be examined for the defects specified in 4.4.3.1 and 4.4.3.2 and tested for the characteristic in table XI. The presence of any defect or failure of any test shall be cause for rejection of the first article.

\* 4.4 Quality conformance inspection. Unless otherwise specified, sampling for inspection shall be performed in accordance with MIL-STD-105.

4.4.1 Component and material inspection. In accordance with 4.1, components and materials shall be inspected in accordance with all the requirements of referenced documents unless otherwise excluded, amended, modified, or qualified in this document or applicable purchase document. In addition, testing shall be performed on components and materials listed in table X. When the data in the "Number of determinations per sample unit" and "Results reported as" columns are not specified in table X, they shall be as required by the referenced test method. The vamp lining leather sampling procedure shall be in accordance with FED-STD-311. All test reports shall contain the individual values utilized in expressing the final results. The lot shall be unacceptable if one or more sample units, the lot average, or the composite sample fail to meet any requirement specified. The sample size (except for lining leather) shall be as follows:

<u>Lot size</u>	<u>Sample size</u>
800 or less	2
801 to and including 22,000	3
22,001 and over	5



TABLE X. Component tests

Component and lot expressed in terms of	Characteristic	Requirement para.	Test method	Requirement applicable to		No. determinations per sample unit	Results reported as	Sample unit
				Sample unit	Lot average			
Insole (Texorist)	Copper-8-quinolinate	3.3.1.4	2/	-	-	-	-	-
Vamp lining (calf, kip, or side leather)	Paranitrophenol	3.3.1.5	6711 1/	-	3/	-	-	See 4.4.1
	Thickness	3.3.1.5	1011 1/	X	-	-	-	
	Material identification	3.3.1.5	2/	-	-	-	-	
	Tannage	3.3.1.5	2/	-	-	-	-	
Heel pads (1 pad)	Paranitrophenol	3.3.1.6	6711 1/	-	3/	-	-	5 heel pads
	Material identification	3.3.1.6	2/	-	-	-	-	
	Thickness	3.3.1.6	1011 1/	X	-	-	-	
	Tannage	3.3.1.6	2/	-	-	-	-	
Counters, polyethylene (1 pair)	Density	3.3.2.2	D 792 4/	X	-	-	-	8 counters
	Melt index	3.3.2.2	D 1238 4/	-	X	-	-	
	Tensile strength	3.3.2.2	2/	-	-	-	-	
	Elongation	3.3.2.2	2/	-	-	-	-	
Pegs, heel seat	Material identification	3.3.3	2/	-	-	-	-	-
	Diameter	3.3.3	2/	-	-	-	-	-
Midsoles (pairs)	Nonmarking	3.3.4.1	4.5.3.1	X	-	-	Pass or fail	2 pairs
	Hardness (before and after aging)	3.3.4.1	D 2240 4/ 5/	X	-	-	Pass or fail	
	Cut growth	3.3.4.1	4.5.3.2	X	-	2	Percent	
	Thickness	3.3.4.1	2/	-	-	-	-	
Steel box toe (1 pair)	Material identification	3.3.5.1	2/	-	-	-	-	-
	Hardness	3.3.5.1	E 18 4/	X	-	3	Hardness number	3 box toes

TABLE X. Component tests (cont'd)

Component and lot expressed in terms of	Characteristic	Requirement para.	Test method	Requirement applicable to Sample unit	No. determinations per sample unit	Results reported as	Sample unit
Steel box toe (1 pair) (cont'd)	Carbon content	3.3.5.1	2/	-	-	-	-
	Thickness	3.3.5.1	2/	-	-	-	-
	Coating identification	3.3.5.1	2/	-	-	-	-
Nails, tacks and staples	Material identification	3.3.5.3 and 3.3.5.4	2/	-	-	-	-
Eyelets 1 pound	Material identification	3.3.5.5	2/	-	-	-	-
	Thickness	3.3.5.5	2/	-	-	-	-
	Outside diameter of flange and barrel	3.3.5.5	Gage	X	2	0.001 inch	2 eyelets
	Diameter of hole	3.3.5.5	Gage	X	2	0.001 inch	
	Overall length	3.3.5.5	Gage	X	2	0.001 inch	
Masking tape	Finish	3.3.5.5.1	2/	-	-	-	-
	Material identification	3.3.6.2.2	2/	-	-	-	-
Toe cushion (polyurethane)	Material identification	3.3.6.2.3	2/	-	-	-	-
Insole ribbing fabric 1 yard full width	Material identification	3.3.6.3.1	2/	-	-	-	-
	Weight	3.3.6.3.1	5041 2/6/	-	-	-	-
	Yarns per inch	3.3.6.3.1	5050 2/6/	-	-	-	-
	Breaking strength	3.3.6.3.1	5100 2/6/	-	-	-	-

TABLE X. Component tests (cont'd)

Component and lot expressed in terms of	Characteristic	Requirement para.	Test method	Requirement applicable to Sample unit	No. determinations per sample unit	Results reported as	Sample unit
Bottom filler 1 pound	Material identification	3.3.8	2/	-	-	-	-
	Solubility of binder in water	3.3.8.1 and 3.3.8.2	2/	-	-	-	-
	Softening point of binder	3.3.8.1 and 3.3.8.2	E 28 4/	-	X	Avg. of 2 determinations to nearest 10F	1 pound composite
	Penetration of binder	3.3.8.1	D 5 4/	-	X	Avg. of 3 determinations to nearest mm	
	Proportion of cork to binder	3.3.8.1 and 3.3.8.2	2/	-	-	-	
Shank board (1 pair)	Material identification	3.3.9.1	2/	-	-	-	-
	Thickness	3.3.9.1	2/	-	-	-	-
	Material identification	3.3.9.2	2/	-	-	-	-
Steel shank (1 pair)	Hardness (Rockwell C scale)	3.3.9.2	E 18 4/	X	-	Hardness number	1 steel shank
	Coating identification	3.3.9.2	2/	-	-	-	-
	Shank width and thickness	3.3.9.2	2/	-	-	-	-

TABLE X. Component tests (cont'd)

Component and lot expressed in terms of	Characteristic	Requirement para.	Test method	Requirement applicable to Sample unit average	No. determinations per sample unit	Results reported as	Sample unit
Adhesive	Material identification	3.3.11	<u>2/</u>	-	-	-	-
Adhesive (sole)	Material identification	3.3.11.1	<u>2/</u>	-	-	-	-
Wax	Material identification	3.3.12	<u>2/</u>	-	-	-	-

1/ Refers to FED-STD-311.

2/ A certificate of compliance shall be submitted and will be acceptable for the stated requirement.

3/ Requirement applicable to composite.

4/ Refers to ASTM Standard.

5/ Aging shall be at a temperature of  $158^{\circ} \pm 1^{\circ}\text{F}$  for  $166 \pm 1$  hours in accordance with ASTM D 573 procedures for accelerated aging.

6/ Refers to FED-STD-191.

4.4.1.1 Examination of components.

4.4.1.1.1 Examination of insoles. The Texorist insoles, when used, shall be examined for the defects listed below. The lot size shall be expressed in units of one insole. The sample unit shall be one insole. The inspection level shall be II and the acceptable quality level (AQL), expressed in terms of defects per hundred units, shall be 4.0.

Any hole, cut, tear, or gouge.

Any brittle area or evidence of delamination.

Thickness not as specified.

Sole outline does not conform to required pattern.

Not cut in specified direction.

4.4.2 In-process inspection. Inspection shall be made at any point or during any phase of manufacturing to determine whether operations or assemblies are accomplished as specified. When leatherboard midsoles are used, the contractor shall furnish a certificate of compliance indicating that the requirements of 3.7.6.2 have been complied with. The Government reserves the right to exclude from consideration for acceptance any material or service for which in-process inspection has indicated nonconformance.

4.4.2.1 In-process examination. The defects found during in-process examination shall be classified in accordance with 4.4.2.1.1 and 4.4.2.1.2. The inspection level shall be II and the (AQL), expressed in terms of defects per hundred units, shall be 2.5 for major defects and 6.5 for total (major and minor combined) defects.

NOTE: Defects designated by an asterisk shall be scored as major when seriously affecting serviceability and minor when affecting serviceability but not seriously.

4.4.2.1.1 Examination of uppers after all fitting. The upper assembly shall be examined for the defects listed below which cannot be seen in the end item. The sample unit shall be one completely fabricated upper assembly prepared for lasting. The lot size shall be expressed in units of one upper.

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Examine	Defect	Classification	
		Major	Minor
Construction and workmanship	Any component missing or not specified type	X	
	Any component misplaced or not affixed as specified		*
	Vamp stitched more than 5/32 inch from edge of throat	X	
	Vamp stitched more than 3/32 inch from edge at throat but not over 5/32 inch		X
	Vamp throat or wings not skived	X	
	Quarter not skived as specified	X	
	Backseam not rubbed down		X
Quality of leather	Thickness more than 1/2 ounce less than the minimum specified	X	
	Thickness less than the minimum but not exceeding 1/2 ounce less		X
	Thickness more than maximum specified		X
	Rough fiber on flesh side of quarters		*
	Off stretch cut	X	
	Slaughter cut		*
Lining leather	Not soft and pliable	X	
	Pipey or flanky		*

4.4.2.1.2 Examination of shoe before bottom filling. The partially fabricated shoe shall be examined for the defects listed below which cannot be seen in the end item. The sample unit shall be one partially constructed shoe at a point after lasting and attachment of shank but before the application of the bottom filler. The lot size shall be expressed in units of one shoe.

Examine	Defect	Classification	
		Major	Minor
Bottom of shoe	Any component missing or not specified type	X	
	Shank not properly positioned or not fitting contour of shoe bottom		*
	Shank wrong size, malformed or not securely attached		X
	Any tear in cotton duck in stitch area:		
	- more than 3/4 inch	X	
	- more than 1/2 but not more than 3/4 inch		X

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Examine	Defect	Classification	
		Major	Minor
Bottom of shoe	Any insole tack, staple, or anchor tack not removed	X	
	not removed	X	
	Excess leather in heel seat interfering with proper fit of shank		X
	Upper damaged in lasting		*
	Poor heel seat, side or toe lasting		*
	Inseam not properly trimmed		*
	Less than 3 stitches per inch on inseam	X	
	Less than 3-1/4 but not less than 3 stitches per inch on inseam		X
	Inseam stitches broken, two or more consecutive skipped inseam stitches, or inseam stitches cut or damaged during trimming operation:		
	- not repaired	X	
	- not repaired as specified		X
	Inseam stitches not at bottom of insole rib or not in welt groove		*
	Broken insole rib	X	
	End of counter not caught in inseam stitching		X
	Welt not properly beaten out i.e., not flat		X
	Welt butts not skived		X
	Welt butts not tacked within butt area		X
Upper part of shoe	Uppers not tightly pulled down to last		X
	Lace opening less 5/8 inch or more than 7/8 inch	X	
	Quarter not laced as specified		X
	Steel box toe out of alignment or crooked		*
	Steel toe missing		<u>1/</u>

1/ Any steel toe found missing in the sample shall be classified as a critical defect and result in rejection of the lot represented.

4.4.2.2 In-process testing.

4.4.2.2.1 Stuck-on rib insole. When used, the stuck-on rib shall be tested for compliance with the requirements of 3.3.6.3.2. Method 2061 of FED-STD-311 shall be used for shear strength test. Method 2171 of FED-STD-311 shall be used

for stitch tear strength. The sample unit shall be two ribbed insoles, one for each test, and the sample size shall be five regardless of the lot quantity. Requirements are applicable to the sample unit for minimum unit requirements and lot average for average requirements. The lot shall be unacceptable if one or more sample units or the lot average of all units fail to meet the requirement specified. All test reports shall contain the individual values utilized in expressing the final results.

4.4.2.2.2 Outsole and leather midsole assembly. When leather midsoles are used, the outsole and leather midsole assembly shall be tested to determine compliance with the bond strength requirement of 3.7.6.1. The test method shall be as specified in 4.5.1. The sample unit shall be one cemented midsole and outsole unit. The lot size shall be expressed in units of one cemented midsole and outsole unit. All test reports shall contain the individual values utilized in expressing the final result. The requirement is applicable to the sample unit. The lot shall be unacceptable if one or more sample units fail to meet the requirement specified. The sample size shall be determined in accordance with 4.4.1.

- \* 4.4.2.2.3 Outsole and rubber midsole assembly. The rubber outsole and midsole assembly shall be tested to determine compliance with the bond strength requirement of 3.7.6.3. The test method shall be as specified in 4.5.1. The sample unit shall be one cemented midsole and outsole unit. The lot shall be unacceptable if one or more sample units fails to meet the specified requirements. The sample size shall be in accordance with 4.4.1.

- \* 4.4.3 End item inspection.

- \* 4.4.3.1 Visual examination. The end items shall be examined for the defects listed below. The sample unit shall be by one completely fabricated shoe and the selection shall be by pairs. The lot size shall be expressed in units of one shoe. The inspection level shall be II and the AQL, expressed in terms of defects per hundred units, shall be 2.5 for major defects and 6.5 for total (major and minor combined) defects. (Note: The AQL does not apply to a protruding point of nail, tack, or staple forward of the heel breastline). Defects of pairing shall be classified as a single defect. Heel pads removed by the Government during verification examination shall be re-cemented and replaced by the manufacturer's personnel. The vamp, and inside and outside quarters of each shoe shall be examined for break of leather in accordance with the procedure outlined below:

(a) To examine the vamp, The shoe shall be held in an upright position with both hands. The toe of the shoe shall face away from the examiner. Position thumbs on top of vamp approximately halfway between box toe line and blucher noses and 1 inch to 1-1/2 inches apart. Press downward with thumbs so as to form grain surface into a concave surface and observe the break pattern. Any vamp exhibiting a break pattern at any location comparable to a break pattern represented by numbers 5 through 8 on the Satra scale (see 6.6) shall be scored a defect. The defect shall be scored regardless of the direction in which the break pattern appears.



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(b) To examine the quarters, the index finger and the second finger held in a "V" position shall be placed against the inside of the quarter, in the mid-section area. The thumb shall be placed on the outside of the quarter directly above the slotted fingers. Pressure shall be applied to the quarter with the thumb and fingers so as to impart a break pattern to the leather. The break pattern of the quarter shall be observed and compared with the break patterns of the Satra scale. Any quarter exhibiting a break pattern comparable to a break pattern represented by numbers 5 through 8 on the Satra scale shall be scored as a defect. The following note regarding defects visible at a distance of 3 feet is not applicable to examination of the break pattern.

NOTES: Appearance, defects shall be scored only when the condition is plainly visible at a distance of 3 feet or more.

Defects designated by an asterisk shall be scored as major when seriously affecting serviceability or appearance and minor when affecting serviceability or appearance but not seriously.

Examine	Defect	Classification	
		Major	Minor
Pairing	Not properly mated, i.e., not right and left of same size	X	
	Variation in color or appearance		*
Cleanness	Any non-removable spot, stain or foreign matter affecting appearance		X
Color and finish	Not specified color	X	
	Finish streaky, chipped, or flaky on upper		X
	Any raw edges not stained to match upper leather		X
	Sole edges not bright or not finished as specified		X
	Heel seat or top of welt not finished as specified		X
Design, type, and size	Not as specified	X	
Upper leather	Leather deeply snuffed, i.e., fiber structure damaged	X	
	Any grub or tick damage, scratch, brand, or boney leather		*
	Fat wrinkles or veins		*
	Stretchy vamp	X	
	Leather embossed or printed	X	

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Examine	Defect	Classification	
		Major	Minor
Break pattern of vamps and quarters	Break pattern comparable to break pattern represented by numbers 5 through 8 on Satra break scale	X	
	NOTE: Leather exhibiting a break pattern comparable to the numbers indicated above is considered to be loose, pipey, or flanky. The break shall be determined in accordance with 4.4.3.1.		
Construction and workmanship	Any cut, tear, hole, repair, or factory damage		*
	Any component or assembly omitted or misplaced, operation omitted or not properly performed (unless otherwise classified herein)		*
	Wrinkled or bunched area at the back seam		*
	Loose leather fibers exposed along cut edge of quarter vamp line or cut edge of counterpocket		X
Seams and stitching (upper) upper	Open seam not repaired	X	
	Repair of open seam not as specified		X
	NOTE: A seam shall be classified as open when one or more stitches joining a seam are broken or when two or more consecutive skipped or run-off stitches occur. On multiple stitched seams, a seam is considered open when either one or both sides of the seam are open. When any of the above conditions occurs on the inside of the shoe, it shall be scored as an asterisk (*) defect.		
	Loose tension resulting in a loosely secured seam		*
	Tight tension resulting in puckering or cutting of leather		*
	Wrong seam or stitch type	X	

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Examine	Defect	Classification	
		Major	Minor
Seams and stitching (upper) (cont'd)	Any row of stitching with less than 8 stitches per inch but not less than 6 stitches per inch		X
	Any row of stitching with less than 6 stitches per inch	X	
	More than the specified maximum number of stitches		*
	NOTE: A plus tolerance of 3 stitches per inch will be allowed when stitching over heavy places or turning sharp corners.		
	Gage of stitching not as specified or irregular		*
	Stitching omitted where required		*
	Needle holes or needle chew		*
	Thread ends not trimmed throughout shoe		X
	Sand hole, i.e., tongue not properly caught in at throat		X
Outsole stitching	Less than 3-1/2 stitches per inch	X	
	Less than 4-1/2 stitches per inch but not less than 3-1/2 stitches per inch		X
	More than 7 stitches per inch except in ball and toe sole stitching		X
	NOTE: More than 3-1/2 stitches per any 1/2-inch length in the ball and toe stitching shall be classified as a minor defect. The ball and toe sole stitching shall be defined as that portion of the sole stitching that runs from the inside ball and around the toe to the outside ball		
	Broken stitch or two or more consecutive skipped stitches:		
	- not repaired	X	
	- not repaired as specified		X
	Stitches short at heel breast		*

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Examine	Defect	Classification	
		Major	Minor
Outsole stitching (cont'd)	Sole stitching not properly gaged	*	
	Any stitching not visible on surface of outsole	*	
	Stitch locks laying on surface	*	
	Stitches running into traction tread plaque	*	
	Outsole or welt damaged by stitches	X	
Counter	Rolled or curled counter	*	
	Soft counter		X
Edge making	Edge trimmed into sole stitching	*	
	Edge not trimmed square or trimming is irregular affecting appearance		X
	Sole extension less than specified minimum	*	
	Edge setting not as specified	*	
	Checked sole, i.e., separation between outsole and midsole	*	
Heel finishing and attaching	Heel not finished square, i.e., has pronounced flare or taper		X
	Heel not finished smooth, affecting appearance		X
	Open heel seat	*	
	Checked heel, i.e., separation at heel and outer sole		X
	Crooked or wrong size heel		X
Eyelets	Number of eyelets not as specified but each row has the same number		X
	Not the same number of eyelets in each row	X	
	Eyelets not properly spaced within the row or misalignment between the rows to an extent interfering with proper lacing		*
	Edge of any eyelet less than 1/16 inch from the edge of the quarter	X	
	Edge of any eyelet less than 1/8 inch but not less than 1/16 inch or more than 5/16 inch from the edge of the quarter		X
	Any eyelet not securely clinched		X

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Examine	Defect	Classification	
		Major	Minor
Inseaming	Grinning seam, i.e., thread exposed	X	
	Strained seam, i.e., needle holes visible but thread not exposed		X
	Dropped welting, skipped stitches or cut in seam	X	
Lining	Vamp lining loose, wrinkled, or having excessive fullness resulting in a pleat or wrinkle when the figures of one hand are drawn back from the toe towards the blucher noses with moderate pressure against the lining		*
Insole	Short or long		*
	Any protruding point of lasting staple, tack, or nail forward of heel breastline. <sup>1/</sup>		
	Any protruding point of lasting staple, tack, fastener peg, or nail in heel seat area	X	
	No evidence of heel seat fastening		X
	More than three heel seat fastener pegs or nails not properly positioned to edge of insole		X
Heel pad	Not firmly and adequately adhered to heel seat		X
Marking	Missing, incomplete, incorrect, not applied in the specified manner, misplace, illegible, or not specified size		X
ANSI label	Missing, illegible, not as specified, or improperly attached		X

<sup>1/</sup> Any protruding point of lasting staple, tack, or nail forward of the heel breastline, found in the sample, shall cause rejection of the lot represented.

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4.4.3.2 Heel nailing examination. The heel nailing shall be examined for the defects listed below. The sample unit shall be one shoe. The lot size shall be expressed in units of one shoe. The inspection level shall be I and the AQL, expressed in terms of defects per hundred units, shall be 6.5.

<u>Examine</u>	<u>Defect</u>
Heel nailing	More than three nails unclined or runoff insole (does not grip insole. Either or both breast nails unclined or runoff insole. More than two of five back nails unclined or runoff insole. Any heel nail missing.

NOTE: Evidence of brass on the insole shall indicate clinching.

4.4.3.3 End item testing. The finished shoes shall be tested for the characteristic specified in table XI. The sample unit shall be one shoe. All test reports shall contain the individual values utilized in expressing the final result. Requirements are applicable to the sample unit. Any test failure shall be cause for rejection of the lot. The sample size shall be as follows:

<u>Lot size (pairs)</u>	<u>Sample size</u>
800 or less	2
801 up to and including 22,000	3
22,001 and over	5

TABLE XI. End item test

<u>Characteristic</u>	<u>Requirement paragraph</u>	<u>Test method</u>	<u>Number of determinations per sample unit</u>
Impact resistance of steel box toe	3.3.5.1.1	4.5.2	1

4.4.4 Packaging examination. The fully packaged end items shall be examined for the defects listed below. The lot size shall be expressed in units of shipping containers. The sample unit shall be one shipping container fully packaged. The inspection level shall be S-2 and the AQL, expressed in terms of defects per hundred units, shall be 2.5.

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<u>Examine</u>	<u>Defect</u>
Marking (exterior and interior)	Omitted; incorrect; illegible; of improper size, location, sequence, or method of application.
Materials	Any component missing, damaged, or not as specified.
Workmanship	Inadequate application of components, such as: incomplete closure of container flap, loose strapping, improper taping, or inadequate stapling. Bulged or distorted container.
Contents	Number of shoes per container is more or less than required. Size indicated on shoes not the same as specified on unit packs or shipping containers. <u>1/</u>

1/ For this defect, one unit pack from each container in the sample shall be examined.

- \* 4.4.5 Palletization examination. The fully packaged and palletized end items shall be examined for the defects listed below. The lot size shall be expressed in units of palletized unit loads. The sample unit shall be one palletized unit load, fully packaged. The inspection level shall be S-1 and the AQL, expressed in terms of defects per hundred units, shall be 6.5.

<u>Examine</u>	<u>Defect</u>
Finished dimensions	Length, width, or height exceeds specified maximum requirements.
Palletization	Pallet pattern not as specified. Interlocking of loads not as specified. Load not bonded as specified.
Weight	Exceeds maximum load limits.
Marking	Omitted; incorrect; illegible; of improper size, location, sequence, or method of application.

#### 4.5 Methods of inspection.

##### 4.5.1 Bond strength test of outsole and midsole.

4.5.1.1 Specimen. The specimen shall be a combined midsole-outsole unit which has aged at least 2 days. The outsole shall be separated from the midsole for a distance of approximately 2-1/2 inches from the toe end of the specimen.

4.5.1.2 Apparatus. A power-driven portable gage tong adhesion machine, or an approved portable testing device of equal performance shall be used. The rate of travel of the power actuated grip shall be 2 inches per minute. The machines shall be operated without any device for maintaining maximum load indication.

4.5.1.3 Procedure. The separated toe ends of the specimen shall be clamped in the jaws of the machine, with the jaws 2 inches apart. The specimen shall extend outward at right angles to the direction of the application of the load. The machine shall be started and the outsole and midsole shall be pulled apart for a distance of 1 inch. At that instant, the load indicated on the machine shall be read and recorded. The load shall be divided by the width of the specimen at the corresponding line of separation.

4.5.2 Impact test of steel box toe. The impact test described below shall be made on a finished shoe or on the toe section of a shoe obtained by sawing through the short dimension of the shoe not less than 1/2 inch back of the box toe. A falling weight of steel or other suitable material, weighing not less than 49-1/2 pounds nor more than 50-1/2 pounds,  $1 \pm 0.02$  inch in diameter and with a striking face made hemispherical in shape by rounding on a 1-inch radius, equipped to drop freely in a tube or other suitable guide, shall be used. The weight shall be dropped from a distance of  $18 \pm 1/4$  inches above the top of the box toe. As an alternate, a falling weight of  $25 \pm 1/4$  pounds shall be dropped from a distance of  $36 \pm 1/2$  inches. The equipment shall be assembled so that the center of the striking face of the falling weight will strike the shoe at midwidth 1/2 inch in front of the back edge of the box toe. The shoe (or toe-section) shall be mounted on an anvil (or rigidly mounted bedplate), of steel or other suitable material weighing not less than 500 pounds, equipped with suitable guides (or clamps) to hold shoe specimen in place. In performing the test, the instantaneous clearance may be determined by placing lumps of plastic material such as wax or modeling clay inside the shoe directly below the point of impact. The plastic material should be compressed with the fingers so that it contacts both upper and lower inside surfaces of the shoe, before the test is made. When in place, the greatest horizontal dimension of the lumps should not exceed 1 inch. Any approved method for impact testing is contained in American National Standard ANSI Z41. Results shall be reported as "pass" or "fail".

#### 4.5.3 Rubber midsole tests.

4.5.3.1 Nonmarking test. One corner of the specimen shall be drawn firmly across a sheet of white bond paper. Any resulting marking that cannot be easily removed by rubbing with the fingers shall be considered a test failure.

4.5.3.2 Cut growth after aging test. Cut growth after aging shall be determined in accordance with ASTM D 1052, except that the results shall be reported as percent cut growth after 25,000 cycles and a reading after each 10 percent cut growth shall not be reported. Aging shall be conducted in accordance with ASTM D 573. Specimens shall be aged 24 hours at  $100^{\circ} \pm 1^{\circ}\text{C}$ .



## 5. PACKAGING

5.1 Preservation. Preservation shall be level A or Commercial as specified (see 6.2).

- \* 5.1.1 Level A. Each pair of mated shoes shall be unit packed in a two-piece partial telescope style folding or setup paperboard box. The outside dimensions of the box (lid included) shall be 14-7/8 inches in length, 7-3/4 inches in width, and 5 inches in depth, with the lid 1 inch in depth.

5.1.1.1 Folding boxes. Folding boxes shall be fabricated from kraft-lined chipboard not less than 0.032 inch thick conforming to variety 1, style III, type G, class j, subclass 2 of PPP-B-566.

5.1.1.2 Setup boxes. Setup boxes shall be fabricated from paperboard not less than 0.040 inch thick conforming to type II, variety 1, class A or D, style 4 of PPP-B-676.

5.1.2 Commercial. Shoes shall be preserved in accordance with ASTM D 3951.

5.2 Packing. Packing shall be level A, B, or Commercial, as specified (see 6.2).

- \* 5.2.1 Level A packing. Nine pairs of shoes of one size and width only, preserved as specified in 5.1, shall be packed in a snug-fitting fiberboard shipping container conforming to style RSC, grade V2s of PPP-B-636. Level A unit packs shall be packed on end, three in length, three in width, and one in depth within a shipping container. Inside dimensions of shipping containers shall approximate 23-1/2 inches in length, 15 inches in width, and 15 inches in depth. Approximate dimensions are furnished as a guide only. Each shipping container shall be closed in accordance with method III, waterproofed in accordance with method V, and reinforced as specified in the appendix of PPP-B-636, except that the inspection shall be in accordance with 4.4.4. Shipping containers shall be arranged in unit loads in accordance with MIL-L-35078 for the type and class of load specified (see 6.2). Strapping shall be limited to nonmetallic strapping, except for type II, class F loads.

5.2.2 Level B packing. Nine pairs of shoes of one size and width only, preserved as specified in 5.1, shall be packed in a snug-fitting fiberboard shipping container conforming to style RSC, type CF (variety SW) or SF, class domestic, grade 275 of PPP-B-636. Level A unit packs shall be packed on end, three in length, three in width, and one in depth within a shipping container. Inside dimensions of shipping containers shall approximate 23-1/2 inches in length, 15 inches in width, and 15 inches in depth. Approximate dimensions are furnished as a guide only. Each shipping container shall be closed in accordance with method II as specified in the appendix of PPP-B-636, except that the inspection shall be in accordance with 4.4.4.

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5.2.2.1 Weather-resistant fiberboard containers. When specified (see 6.2), the shipping container shall be a grade V3c, V3s, or V4s fiberboard box fabricated in accordance with PPP-B-636 and closed in accordance with method III as specified in the appendix of PPP-B-636, except that the inspection shall be in accordance with 4.4.4.

5.2.3 Commercial. Shoes, preserved as specified in 5.1, shall be packed in accordance with ASTM D 3951.

- \* 5.3 Palletization. When specified (see 6.2), shoes, packed as specified in 5.2.2 and 5.2.3, shall be palletized on a 4-way entry pallet in accordance with load type Ia of MIL-STD-147. Pallet types shall be type I (4-way entry), type IV, or type V in accordance with MIL-STD-147. Pallets shall be fabricated from wood groups I, II, III, or IV of MIL-STD-731. Each prepared load shall be bonded with primary and secondary straps in accordance with bonding means K and L or film bonding means O or P. Pallet pattern shall be number 3 in accordance with the appendix of MIL-STD-147. Interlocking of loads shall be effected by reversing the pattern of each course.

5.4 Marking. In addition to any special marking required by the contract or purchase order, unit packs, shipping containers and palletized unit loads shall be marked in accordance with MIL-STD-129 or ASTM D 3951, as applicable.

5.4.1 Width marking. Following the nomenclature and size designation, in the same size lettering, the width shall be spelled out; i.e., "EXTRA NARROW", "NARROW", "REGULAR", "WIDE", OR "EXTRA WIDE".

## 6. NOTES

6.1 Intended use. The safety shoe is intended for use by male personnel where assigned duties require wear of nonsparking safety shoes or by male personnel where assigned duties require wear of safety shoes to prevent injury from heavy falling objects.

- \* 6.2 Ordering data. Acquisition documents should specify the following:
- a. Title, number, and date of this document.
  - b. Sizes and widths required (see 1.2).
  - c. When a first article is required (see 3.2, 4.3, and 6.4).
  - d. Selection of applicable levels of preservation and packing (see 5.1 and 5.2).
  - e. Type and class of unit load required (see 5.2.1).
  - f. When weather-resistant grade fiberboard shipping containers are required for level B packing (see 5.2.2.1).
  - g. When palletization is required (see 5.3).

6.3 Samples. For access to samples, address the procuring activity issuing the invitation for bids.

\* 6.4 First article. When a first article is required, it shall be inspected and approved under the appropriate provisions of FAR 52.209. The first article should be a preproduction sample. The contracting officer should specify the appropriate type of first article and the number of units to be furnished. The contracting officer should include specific instructions in all acquisition instruments regarding arrangements for selection, inspection, and approval of the first article.

6.5 Recycled material. It is encouraged that recycled material be used when practical as long as it meets the requirements of this document (see 3.3).

6.6 Satra scale. The Satra scale may be obtained from the British Shoe and Allied Trade Research Association, Satra House, Kettering, Northants, England or may be obtained from Satra House's North American agent: Bata Engineering Batawa, Ontario, Canada.

6.7 Fiberglass shank. A fiberglass shank manufactured by American Shoe Machinery Co., 30 Nashua Street, Woburn, MA 01801 under their designation "TRU-FIT" has been found to meet the requirements of 3.3.9 for fiberglass shanks."

6.8 Subject term (key word) listing.

Nonsparking  
Safety  
Shoes, high

6.9 Changes from previous issue. The margins of this document are marked with an asterisk (\*) to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only, and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

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Custodians:

Army - GL  
Navy - NU

Preparing activity:

Army - GL  
Project No. 8430-0358

Review activities:

Army - MD  
DLA - CT

User activity:

Navy - SH

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# STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER  
MIL-S-41821H

2. DOCUMENT TITLE  
Shoes, Nonsparking, Safety, High

3a. NAME OF SUBMITTING ORGANIZATION

4. TYPE OF ORGANIZATION (Mark one)

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☐

USER

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MANUFACTURER

☐

OTHER (Specify): \_\_\_\_\_

b. ADDRESS (Street, City, State, ZIP Code)

## 5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

## 6. REMARKS

7a. NAME OF SUBMITTER (Last, First, MI) - Optional

b. WORK TELEPHONE NUMBER (Include Area Code) - Optional

c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional

8. DATE OF SUBMISSION (YYMMDD)